

**NEW SPECIES OF *PHYLLOPHAGA* HARRIS FROM
MESOAMERICA (COLEOPTERA:
MELOLONTHIDAE; MELOLONTHINAE)**

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Abstract.—*Phyllophaga ilhuicaminai* Morón NEW SPECIES is described from western and central localities of Mexico, and *Phyllophaga caanchaki* Morón NEW SPECIES is described from southeastern Mexico and northern Guatemala. Both species have wide geographical distributions, and are not included in any species group of the genus. Drawings of sclerotized male and female genital structures are included.

Key Words.—Insecta, May beetles, *Phyllophaga*, Taxonomy, Mexico, Guatemala.

Resúmen.—Se describe *Phyllophaga ilhuicaminai* Morón, NUEVA ESPECIE con base en 70 ejemplares recolectados en bosques tropicales caducifolios, encinares, matorrales espinosos y terrenos agrícolas de los estados de Michoacán, Jalisco, México, Guerrero, Morelos y Puebla, México. También se describe *Phyllophaga caanchaki* Morón, NUEVA ESPECIE con 36 ejemplares obtenidos en bosques tropicales caducifolios y perennifolios, y terrenos agrícolas de los estados de Chiapas, Quintana Roo y Campeche, México, así como en la provincia de Petén, Guatemala. Debido a la peculiar combinación de caracteres morfológicos, no es posible incluir a ninguna de estas dos especies en alguno de los grupos de especies del género hasta ahora definidos. Se incluyen dibujos de las estructuras genitales masculinas y femeninas de las dos especies y se comentan sus relaciones con otras especies mesoamericanas.

The structure of tarsal claws has been used as one of the primary characters in the taxonomy of *Rhizotrogina* and *Phyllophaga* species. Bates (1887–1889), Saylor (1942), Sanderson (1958), Morón (1986) and other authors, proposed groups of species, subgenera and genera mainly based on the shape, proportions and symmetry of claws. Nearly 500 American species of *Phyllophaga* (*sensu lato*) show toothed, bifid or notched tarsal claws, but less than 20 possess, finely serrate or micro-dentate claws. These species are not easy to place in subgenera or species groups and are usually considered as “*incerta sedis*”.

During collecting trips to many localities in western, central and southeastern Mexico, and while examining museum collections from Mexico, the U.S.A. and Canada, I found nearly one hundred specimens of two species of *Phyllophaga* with different, “simple” tarsal claw structure, not related to any of the species group defined by Morón (1986). This paper describes males, females, and their variation and gives the distribution of two new species. The characters and terms used in the descriptions are those of Morón (1986). Drawings were made with the aid of a camera lucida and Carl Zeiss stereomicroscope; measurements were obtained with ocular micrometer or caliper.

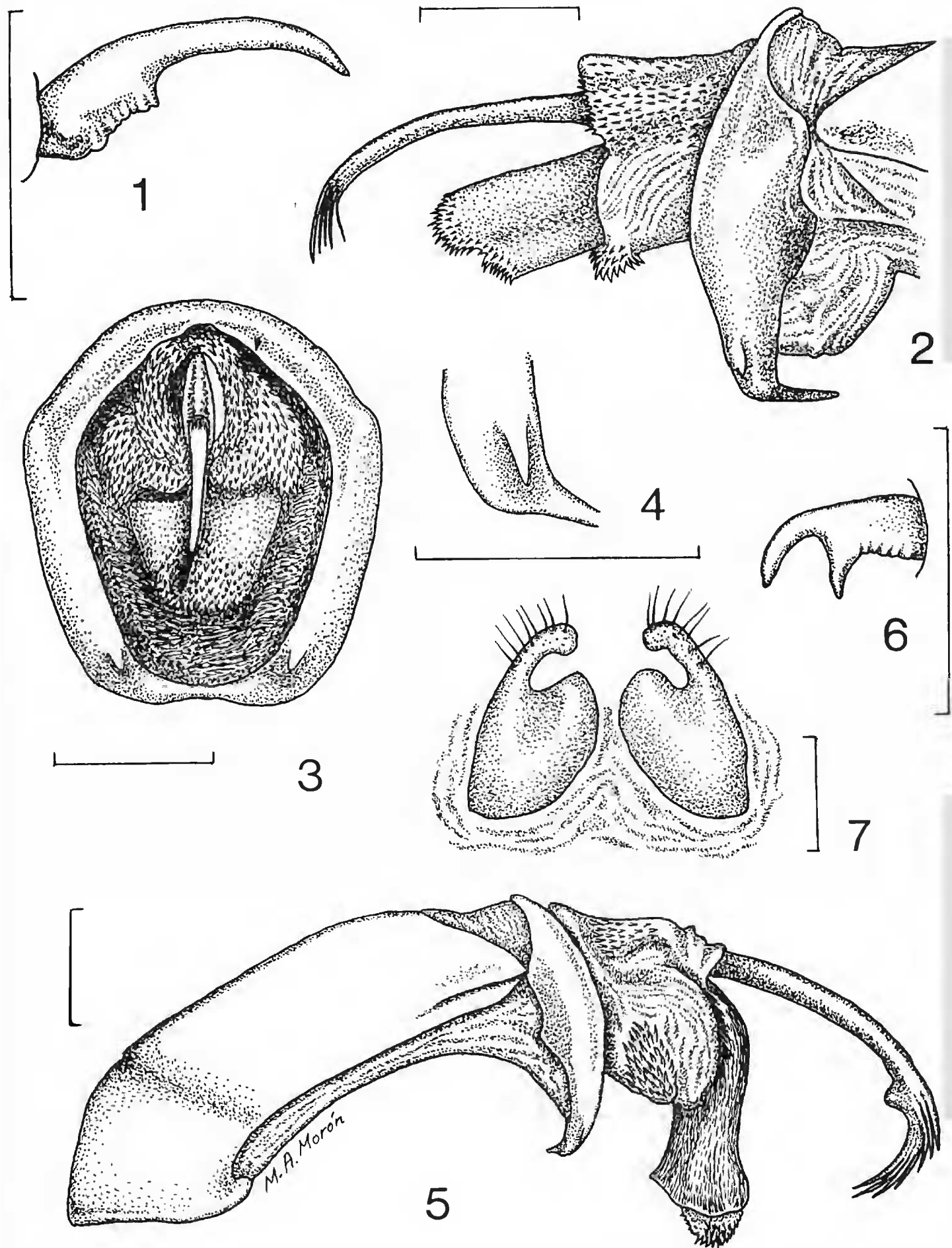
Depository Abbreviations.—California Academy of Sciences, San Francisco (CASC); the Natural History Museum, London (BMNH); Canadian National Collection, Ottawa (CNC); Instituto de Biología, UNAM, México City (IBUNAM); Instituto de Ecología, Xalapa, Veracruz (IEXA); University of Nebraska State Museum, Lincoln, Nebraska (UNSM); Field Museum Natural History, Chicago

(FMNH); Universidad del Valle de Guatemala, Guatemala City, (UVG); Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, SAGAR, Celaya, Guanajuato (INIFAP); Benemérita Universidad Autónoma de Puebla (DICA); A. & H. Howden, Ottawa (AHHC); G. Nogueira, Guadalajara, Jalisco, México (GNPC); S. Pokorny, Praha, Czech Rep. (SPPC); J. P. Beraud, Cuernavaca, Morelos, México (JBPC); C. Deloya (ACDC) and M. A. Morón, Xalapa, Veracruz (MXAL) México.

Phyllophaga ilhuicaminai Morón, NEW SPECIES
(Figs. 1–7)

Types.—(described from 46 males and 24 females). Holotype, male; MEXICO. *MICHOACÁN*: Jungapeo, 29 Jun 1967, G. Halffter; deposited: Canadian National Collection, Ottawa. Allotype, female; MEXICO. *GUERRERO*: Chilpancingo, Palo Blanco, 20 Jun 1987, bosque pino-encino, 1140 m, Morón, Deloya, Delgado; deposited: M. A. Morón collection, Xalapa. Paratypes: same data as holotype (14 males, 3 females); same data as allotype (5 males, 3 females); same data as allotype except: Apr.–May, 1987 (3 males, 1 female). *GUERRERO*: Acahuizotla, 11 Jul 1986, bosq. trop. Mediano subperennifolio, luz 2000–2300 hrs, 650 m, L. Delgado (1 female); same data except: 4 Aug 1986, 2000–2200 hrs (1 female); 19 Jun 1987 (1 female); 18 Jun 1985, 750 m (3 males, 1 female); 4 Sep 1985 (1 female); 6 Jun 1986, 2100–2200 hrs, Ruiz and Martínez (1 male). *JALISCO*: Chamela, 2 Aug 1985, luz, R. Ayala (2 males); Est. Biol. Chamela, 23 Aug 1985, luz, R. A. Usela (1 male); Casimiro Castillo, 17 Jun 1994, 390 m, G. Nogueira (1 male). *MICHOACÁN*: Coalcomán, Los Laureles, 7 Aug 1983, T. W. Taylor (2 males). *MÉXICO*: Santo Tomás de los Plátanos, Jun 1993, S. Pokorny (8 males, 11 females). *MORELOS*: Tepoztlán, 21 May 1990, J. P. Beraud (1 male). *PUEBLA*: Atlixco, La Joya, 14 Mar 1996, suelo cultivo estatis, 1770 m, A. Aragón (1 male); same data except: 4 Jun 1996, luz 2030–2100 hrs, A. M. Tapia, A. Aragón, R. Rojas (2 males); Tzicatlacoyan, 17 May 1996, 2000 m, raíces de encino, A. Aragón (2 males); same data except: 15 Jul 1996, luz 2000–2100 hrs, S. Caselín, A. Aragón (2 males). Paratypes are deposited at CASC, BMNH, CNC, UNSM, IBUNAM, IEXA, DICA and in the private collections AHHC, GNPC, SPPC, JBPC, ACDC and MXAL.

Holotype.—Male. Head and pronotum shining testaceous, elytra similarly colored but slightly opaque; mouth parts, sterna, pygidium and legs shining testaceous. Clypeus semicircular, wider than long (2.5:1), anterior border curved with margins slightly elevated, surface nearly flattened, rugo-punctate with some scattered microscopic setae. Fronto-clypeal suture slightly sinuated, deeply impressed at sides, obsolete at midline. Frons wider than long (1.3:1) convex, coarsely rugoso-punctate, with erect, slender setae. Antenna 9 segmented, with 3 segmented club; lamellae 1.5 × longer than the length of the basal segments combined, segment 5 longer than 4, with a short, rounded tubercle; segment 6 very short. Frons 2.5 × wider than each eye dorsal diameter. Canthus short and narrowed, with 13–14 setae. Labrum bilobed, widely sinuated, with scattered slender setae. Mentum slightly concave, rugo-punctate, with lateral setae slender, anterior border widely sinuated. Pronotum wider than long (1.5:1) and 2.8 × wider than frons. Pronotal disk with round punctures separated by more than width of one or two punctures near the midline, becoming confluent on sides; lateral borders widely angulated, marginal bead crenulate, with long slender setae; anterior angles obtuse, not prominent; posterior angles widely obtuse, rounded. Scutellum 1.3 × wider than long, with 18–20 small punctures. Elytron 2.8 × longer than wide, densely punctate, glabrous; epipleural border narrow, extended along the complete margin, provided with dense fringe of short slender setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium



Figures 1–7. *Phyllophaga ilhuicaminai* NEW SPECIES. Figure 1. Male protarsal claw. Figure 2. Lateral view of paramera and partially exposed aedeagus of holotype. Figure 3. Distal view of the paramera and aedeagus of the holotype. Figure 4. Detail of the distal angle of the paramerus of paratype from Atlixco, Puebla, showing the preapical flattened tooth. Figure 5. Lateral view of complete genital capsule of the same paratype. Figure 6. Female protarsal claw. Figure 7. Female ventral genital plates of allotype. Scale lines = 1 mm.

shining, fine and dense punctate-setose. Pygidium convex, shining, with dense, round, shallow regularly distributed setiferous punctures; apical margin with 15 long, slender setae; basal margin effaced at the middle. Pterosternon with long, dense, yellow vestiture. Visible abdominal sternites 3 and 4 slightly flattened and polished near the midline; sternite 5 with sparse punctures and slender setae at the middle; anal plate slightly prominent, convex, rugo-punctate, with 70–80 slender, short and long mixed setae. Protibiae shorter than protarsi (1:1.7), with external border tridentate, preapical spur long, straight, acute, shorter than protarsomerus 2. Mesotibiae with one oblique, strong, setiferous, transverse carina; upper apical spur straight, narrow, $1.3 \times$ longer than the lower spur. Metatibiae shorter than metatarsi (1:1.4), with one oblique, strong setiferous transverse carina; apical spurs articulated with the border, upper spur curved, shorter than metatarsomerus 2, and $1.4 \times$ longer than the lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and two lines of setae ventrally. Tarsal claws symmetrical, similar on all legs, tooth very short, postmedian, acute and followed by serrate basal edge (Fig. 1). Genital capsule with shortened paramera, fused in a ring shaped structure, apex slightly sinuated, bearing a large ventral bidentate projection which is angulated posteriorly (Figs. 2–3). Paramera with flattened teeth near apex of distal side (Fig. 3). Aedeagus long, with semitubular, sclerotized support surrounded by patches of spinules, and one dorsal sclerotized rod with apical setae (Figs. 2, 5). Tectum uniformly convex. Length of genital capsule from the apex of parameres to the border of basal piece: 4.5 mm. Total body length: 17 mm. Humeral width: 6.5 mm.

Allotype.—Female. Similar to the male except as follows: clypeus slightly trapezoidal; clypeus and frons more rugo-punctate; antennal club 0.6 the length of the basal segments combined; pygidium semitriangular, more convex toward the apex. Visible abdominal sternites 3 to 5 convex, with scattered setiferous punctures; anal plate convex, punctate, with 65–70 slender, short and long setae. Apical spurs of metatibiae curvate. Tarsal claws dentate, with large, median, acute tooth followed by serrate basal edge (Fig. 6). Ventral genital plates slightly sclerotized, symmetrical, nearly ovate, with setae on the distal curvate projection (Fig. 7). Total body length: 16.2 mm. Humeral width: 6.1 mm.

Type Locality.—Jungapeo de Juárez, near Zitacuaro, state of Michoacán, Mexico (aprox. $19^{\circ}28' N$; $100^{\circ}30' W$).

Variation.—Paratype males are similar to the holotype except as follows: some specimens have the antennal club slightly shortened; frontoclypeal carina granulate or rugose; anterior half of the pronotal lateral borders slightly sinuated; pygidium with fewer setae; tarsal claws with tooth effaced; flattened teeth on the distal side of paramera more elongate and more acute and smaller (Fig. 4); ventral bidentate process of the paramera shortened (Fig. 5); sclerotized dorsal rod of the aedeagus with ventral preapical tubercle (Fig. 5); total body length: 12.0–16.8 mm, humeral width: 4.0–6.5 mm. Paratype females are similar to the allotype except as follows: pronotum and pygidium more densely punctate; total body length: 13.5–16.5 mm; humeral width: 5.5–6.5 mm.

Biological Data.—Specimens of *P. ilhuicaminai* were collected at lights in tropical deciduous and subdeciduous forests and oak forests located from 150 and 2000 m of altitude, at night between 2000–2300 h. In March an adult was collected from its pupal cell 30 cm deep in soil underneath flower crops of *Limonium sinuatum* (Asteraceae); during May adults were collected from organic soil under the oak trees on which they feed at night. This species is found primarily on the warmest slopes of Transverse Neovolcanic Axis (Fig. 8). Phenology: May (6), June (55), July (2), August (6), September (1). Other species of *Phyllophaga* flying at the same time were *P. (Phytalus) obsoleta* (Blanchard), *Phyllophaga (s.str.) ravidata* (Blanchard) and *Phyllophaga (s.str.) vetula* (Horn).

Remarks.—*Phyllophaga ilhuicaminai* is not closely related to any other Mexican species. Specimens from localities in the state of Puebla (eastern population) have paramera with a shortened ventral bidentate process; specimens from Guer-

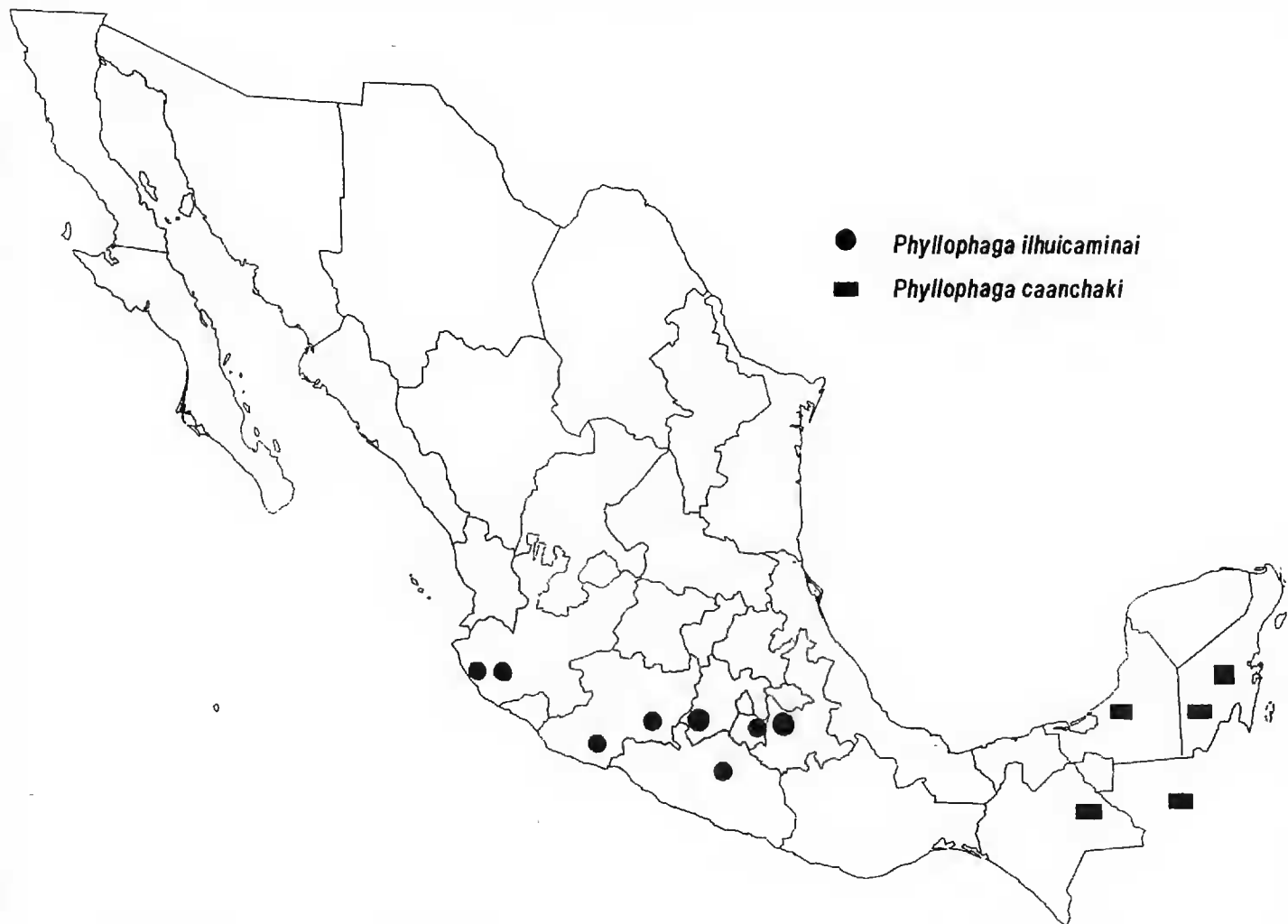


Figure 8. Distribution of *Phyllophaga ilhuicaminai* NEW SPECIES and *Phyllophaga caanchaki* NEW SPECIES.

rero (southern population) have the ventral bidentate process long but less angulate; typical specimens are from Jalisco, Michoacán, México and Morelos (Fig. 8). The elongate body shape, nine-segmented antenna, shape of the tarsal claws and male genital capsule will aid in the recognition of this species.

Etymology.—Derived from *Ilhuicamina*, (“sky bowman”) second name of the fifth Aztec king *Motehuzoma* I (Simeón, 1988), who extended and consolidated the Aztec empire between 1440–1468 A.D. (León-Portilla, 1978).

Material Examined—See Types.

Phyllophaga caanchaki Morón, NEW SPECIES
(Figs. 9–14)

Types.—(described from 15 males and 21 females). Holotype, male; MEXICO. *CHIAPAS*: Yaxchilán, 7 May 1981, 150 m, Selva *Brosimum*, E. Fuentes; deposited: M. A. Morón collection, Xalapa. Allotype, female; MEXICO. *QUINTANA ROO*: 4 km S Tres Garantías, 25 Jun 1988, selva mediana subperennifolia, trampa luz 1900–2200 hrs, D. Garrido y V. A. Poot; deposited: M. A. Morón collection, Xalapa. Paratypes: same data as holotype except 31 May 1981 (1 male); 14 Jun 1981 (3 males); same data as allotype (1 male, 3 females); MEXICO. *QUINTANA ROO*: Xul Ha, 3 Jun 1974, Y. Domínguez (1 male); km 146 carr. Chetumal-Puerto Juárez, 17 Mar 1982, A. Ibarra (1 male); Felipe Carrillo Puerto, 28 May 1984, 10 m, luz neón 2100 hrs, J. F. Camal (1 male, 2 females); *CAMPECHE*: Escárcega, 23 Apr 1962, trap light, F. Islas (2 males); *GUATEMALA*. *PETÉN*: carr.

Flores-Tikal, Jun 1993, 150 m, bosq. tropical, M. A. Morón (4 males, 9 females); same data except C. Deloya (1 male, 6 females). Paratypes are deposited at CASC, BMNH, FMNH, UVG, IBUNAM, INIFAP, IEXA, and in the collections ACDC, GNPC and MXAL.

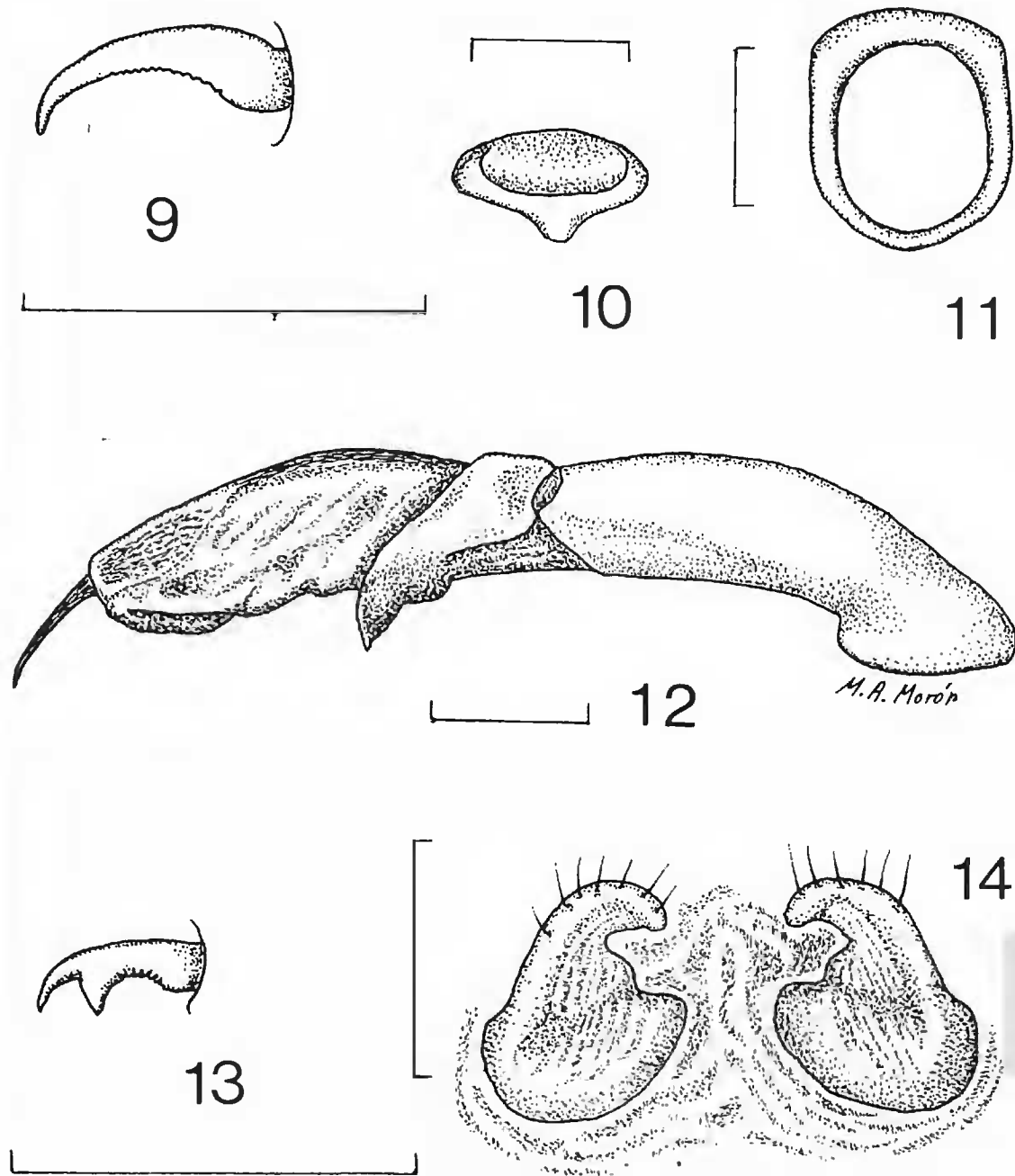
Holotype.—Male. Frons shining dark brown, pronotum and elytra testaceous, with dense vestiture of short, erect setae; clypeus, mouth parts, sterna, pygidium and legs shining testaceous. Clypeus wider than long (3.6:1), anterior border slightly sinuated with elevated margins, surface concave, with sparse, shallow punctures and scattered short setae. Fronto-clypeal suture sinuated, impressed at sides, obsolete at midline. Frons wider than long (2:1) scarcely convex, rugo-punctate, with erect slender setae throughout. Antennae 9 segmented, with 3 segmented club, lamellae $1.3 \times$ longer than the length of the basal segments combined; segment 5 without an anterior process; segment 6 very short, ring-like. Frons $1.5 \times$ wider than dorsal diameter of eye. Canthus narrowed, with 15–16 setae. Labrum bilobed, widely sinuated, with scattered slender setae. Mentum slightly concave, with sparse punctures and slender setae, anterior border widely sinuated. Pronotum wider than long (1.5:1) $2.8 \times$ wider than frons. Pronotal disk setiferous, with shallow, round punctures separated by the width of one puncture near the midline, becoming slightly confluent on sides; lateral borders widely rounded, marginal bead crenulate with long slender setae; anterior and posterior angles obtuse, rounded. Scutellum $1.7 \times$ wider than long with 7 shallow, small punctures. Elytron $3 \times$ longer than wide, setiferous, densely rugo-punctate; epipleural border narrowly extended along the entire margin, provided with short slender setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings fully developed. Propygidium shining, with shallow sparse punctures and scattered short setae. Pygidium convex, setiferous, shining, with round, shallow irregularly distributed punctures; apical margin with 10 long, slender setae; basal margin effaced at the middle. Pterosternon with shortened, yellow setae. Visible abdominal sternites 2 to 5 slightly depressed, with scattered short setae near the midline; anal plate slightly prominent, nearly convex, punctate, with 40–50 long, slender setae. Protibiae slightly shorter than protarsi (1:1.6) with external border tridentate; preapical spur long, straight, acute, as long as protarsomerus 2. Mesotibiae with one oblique, strong, setiferous transverse carina; upper apical spur straight, narrow, and $1.2 \times$ longer than the lower spur. Metatibiae slightly shorter than metatarsi (1:1.3), with one oblique, strong, setiferous transverse carina; apical spurs articulated with the border, upper spur lanceolate, shorter than metatarsomerus 2, and $1.2 \times$ longer than the lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and 2 dense lines of setae ventrally. Tarsal claws symmetrical, similar on all legs, without teeth on the slightly serrate edge (Fig. 9). Genital capsule with elongate paramera, fused at base and apex, the apex is slightly acute and without a ventral process (Figs. 10–12). Aedeagus long, with sclerotized support rod and dorsal needle-like process (Fig. 12). Tectum uniformly convex. Length of genital capsule from the apex of paramera to the border of basal piece: 4 mm. Total body length: 12 mm. Humeral width: 4.5 mm.

Allotype.—Female. Similar to the male except as follows: antennal club as long as the basal segments combined; pygidium nearly flattened, with the apex slightly narrowed; visible abdominal sternites 3 to 5 convex, with scattered setiferous punctures. Protibiae as long as the protarsi; apical spurs of metatibiae with rounded apex; tarsal claws dentate, acute, large, antero-median tooth with the edge feebly serrate (Fig. 13). Ventral genital plates poorly sclerotized, symmetrical, nearly ovate, with setae on the distal curved process (Fig. 14). Total body length: 12 mm. Humeral width: 5 mm.

Type Locality.—Yaxchilán, Ocosingo, state of Chiapas, México (aprox. $17^{\circ}10' N$; $91^{\circ}18' W$).

Variation.—Paratype males are similar to the holotype except as follows: some specimens have antennal segments 3 and 4 nearly fused; the dorsal and pygidial vestiture is more or less dense; total body length: 11.0–12.5 mm; humeral width: 4–5 mm. Female paratypes are similar to the allotype except as follows: the pronotum is more densely punctate and the teeth on the external border of the protibiae are more rounded; total body length: 11.0–12.5 mm; humeral width: 4.5–5.0 mm.

Biological Data.—Specimens of *P. caanchaki* were collected at lights in the tropical subdeciduous forests and tropical rain forests located between 10 and 150



Figures 9–14. *Phyllophaga caanchaki* NEW SPECIES. Figure 9. Male protarsal claw. Figure 10. Ventral-apical view of paramera of holotype. Figure 11. Distal view of same paramera. Figure 12. Lateral view of complete genital capsule of holotype. Figure 13. Female protarsal claw. Figure 14. Female ventral genital plates of allotype. Scale lines = 1 mm.

m of altitude, at night from 1900–2200 h. This species is known from tropical lowlands of the Petén, Guatemala and the southern Yucatán Península (Fig. 8). Phenology: March (1), April (2), May (5), June (29). Other species of *Phyllophaga* flying at the same time were *P. (Chlaenobia) vexata* (Horn) and *P. (s.str.) menetriesi* (Blanchard).

Remarks.—*Phyllophaga caanchaki* is not closely related to any other Mexican, Central American or Antillean species. The small size, elongate body shape, nine segmented antennae, concave clypeus, dorsal vestiture, shape of tarsal claws and male genital capsule will aid in the recognition of this species. Males of *P. pan-orpa* Sanderson from Florida, U.S.A. also possess tarsal claws without teeth and dorsal vestiture composed of short dense setae (Woodruff & Beck 1989), but the number of antennal segments, body size and genital structure are different.

Etymology.—Derived from the second part of the name *Ah cacao-caan chak*, celebrated Mayan king who was born in Campeche and promoted important de-

velopment of the city of Tikal around 700 A.D. (data from exhibitions in Archaeological Museum at Tikal, Guatemala).

Material Examined.—See Type.

ACKNOWLEDGMENT

I am indebted to the following individuals and institutions for the loan or donation of specimens from their collections: J. MacNamara, Canadian National Collection; H. F. Howden, Ottawa; B. C. Ratcliffe, University of Nebraska, (Lincoln, Nebraska); E. Smith, Field Museum Natural History, Chicago; S. Pokorny, Praha, Czech Republic; F. Noguera, Est. Biol. Chamela, Universidad Nacional Autónoma de México; A. Aragón, Benemérita Universidad Autónoma de Puebla, Puebla; A. Marín, Instituto Nacional de Investigaciones Forestales Agrícolas y Pecuarias-Secretaría de Agricultura Ganadería y Desarrollo Rural, Celaya, Guanajuato; J. P. Beraud, Cuernavaca, Morelos; G. Nogueira, Guadalajara, Jalisco; E. Fuentes, Mexico City; D. Garrido, Mérida, Yucatán; J. F. Camal, Carrillo Puerto, Quintana Roo; and C. Deloya, Xalapa, Veracruz.

This study was undertaken while the author was on sabbatical (1996) at the Departamento de Investigaciones en Ciencias Agrícolas (DICA), Benemérita Universidad Autónoma de Puebla (BUAP), México. I acknowledge the aid of Ana María Tapia, Sandra Caselín, Agustín Aragón and Raúl Rojas (DICA) during the capture and preparation of some specimens described in this paper. Field trips in the state of Puebla were conducted with the support of project FB286/H125/96, CONABIO, México-BUAP. The present paper was published with the funds of Departamento de Biosistemática de Insectos, Instituto de Ecología, Xalapa (902-02).

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Received 28 Oct 1996; Accepted 31 July 1997.